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SIMPLE INTEREST.

PROGRESSIVE

Simple Interest

TREATISE:

IN WHICH THE LATEST MODERN IMPROVEMENTS, AND SUCH OLDER PRINCIPLES AS HAVE BEEN WELL ESTABLISHED BY PRACTICAL TESTS, ARE HARMONIZED TOGETHER, BY INTRODUCING THE

NEW AND VALUABLE METHOD

DEVELOPED BY THE AUTHOR, AND A COMPACT SYSTEM OF USEFUL INTEREST TABLES.

DESIGNED AS A COMPLETE TEXT-BOOK ON THE SUBJECT FOR THE

SCHOOL AND BUSINESS OFFICE,

BY

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PREFACE.

As the finding of interest, on a certain sum of money, for a given rate and time, forms the principal portion of several important rules of percentage, it is of the utmost importance that the method used should not only be well understood, but based on as concise principles as can be used with accuracy, in their application to practical examples in the schoolroom or business office.

Every one who has had occasion to solve examples in interest is well aware of the perplexity and discouragement that often attend the methods commonly pursued. For example, the operation may, during necessary divisions, contain decimals, which are carried out as far as may be deemed efficient, and the remain ing ones disregarded. If the division is perfect, the answer may be found with accuracy ; and in proportion to the decimals used will the approach to correctness be developed. When the principal

is a small sum, or the time of short duration, the result may be sufficiently exact for ordinary purposes where only four or five places of decimals are employed ; but where the principal is large, or the time of long duration, the deviation of the final result from the true answer will be very marked, unless a tedious number of decimal figures are used. This is not necessarily taken into account in approximate transactions, though a rule which is exact, provided it is not too comprehensive, is to be admired and chosen. But the scholar and teacher find it necessary that the rule employed in interest be capable of bringing about *perfect* results ; and then, of course, the more simple and brief this can be made, the better will the accountant be satisfied. There are methods described in the principal Arithmetics used in American schools that are accurate when rightly applied, but are not sufficiently so as understood by many operators. When the examples are worked decimally, and the divisions are not perfect, as is often the case, the operator may use the utmost care to avoid mistakes, and yet fail to find the correct answer---for the reason that unknown decimal parts have been removed.

To present in one harmonious whole the latest improvements in the subject of *simple interest*, by introducing what is believed to be the best and most complete interest method yet developed, and finally to give the professional or business man, in a compact and convenient form, a most valuable and reliable system of interest tables, is the design of this work. No pains have been spared to present it in a scientific and attractive manner, and at the same time to make it thorough and accurate.

Should this minature volume receive the kindly notice of educators and business persons, and perchance be the means of relieving the embarrassment of some weary student, the author's highest hopes will have been attained.

VICTORY, OCTOBER, 1875.

INTRODUCTION.

MODERN rules for computing interest are based upon the principle that every interest month contains 30 days, and every interest year 12 months. This gives 360 interest days for each year, instead of 365 days for a common year, and 366 days for each leap year. As interest is reconed at a certain per cent. *per annum* on the sum lent, it is evident that this principle involves a slight inaccuracy of one seventy-third. But this using 30 interest days for a month, seems to have been early adopted for its convenience, and is universally chosen as the standard among professional and business persons everywhere.

The New Method, developed and first published in this work, depends much on the aid of cancellation for its briefness and utility. The method may be used to very good advantage without cancelling equal factors ; but as this nearly always can be accomplished, and very much lessens the labor of multiplying the examples in interest, it has been introduced in the following pages.

Simple Interest.

In business transactions people find the necessity of claiming a certain portion of money for the use or profit of cash loaned, or its equivalent. When money is loaned by an individual or firm, the law provides that such persons shall receive a certain per cent. yearly on the sum lent. Thus, if A loans B money at 6 per cent., for one year, A will be entitled to 6 per cent. of the sum lent ; if for two years, he will be entitled to 6 per cent. of this sum for each year, and in like proportion for any time and per cent. Such a per cent. of any sum loaned, which is due the lender and payable by the borrower, is called *interest.* Then,

INTEREST is the sum paid for the use of money, or its equivalent. When interest is paid on a loan or credit during the whole time, and not including interest previously accumulated, it is known as *simple interest.* Then,

SIMPLE INTEREST is the sum paid for the use of money only, during the whole time of the loan.

When interest is received on a sum previously loaned, the lender is entitled to both the loan and the interest. Then,

AMOUNT is the sum of the loan and interest.

From the above the mind easily perceives that, in tracing the principles of interest, there are five parts involved :

I. The Principal, or the sum loaned.

II. The Rate, or the per cent. paid per annum.

III. The Time, or duration of the loan.

IV. The Interest, or the sum paid.

V. The Amount, or sum of the principal and interest.

As the term *per annum* is a Latin phrase, signifying by the year, and as interest is always computed by the year, it is understood and omitted in commercial forms.

The rate per cent. is such a part of one dollar or one hundred cents, for each year, as it indicates. Thus, if one dollar is loaned for one year, at seven per cent., 1.00 will be the principal ; 7 per cent. of this, or seven *one hundredths*, the rate ; 1 year the time ; 7 cents the interest ; and 1.07 the amount.

Thus it will be seen that the principal,

rate, or time, may be variable, while the interest or amount is always formed from these. The principal and time are each in accordance with the arrangement made by the parties concerned in a business transaction ; while *legal interest*, or the rate established by law varies in different states as follows :

Alabama	8	per	cent.
Florida	8	"	"
Mississippi	8	"	"
Texas	8	"	"
New York	7	"	"
Michigan	7	"	"
Iowa	7	"	"
Wisconsin	7	"	"
South Carolina	7	"	"
Georgia	7	"	"
Maine	6	"	"
New Hampshire	6	"	"
Vermont	6	"	"
Massachusetts	6	"	"
Rhode Island	6	"	"
Connecticut	6	"	"
New Jersey	6	"	"
Delaware	6	"	"
Pennsylvania	6	"	"
Maryland	6	"	"
Virginia	6	"	"

North Carolina . .	6	per cent.
Tennessee	6	" "
Missouri . . .	6	" "
Kentucky . . .	6	" "
Indiana . . .	6	" "
Illinois	6	" "
Ohio	6	" "
District of Columbia .	6	" "
Louisiana . . .	5	" "

The interest on United States' debts varies from the states, being established by law at 6 per cent.

The legal rate of interest for England and France is each 5 per cent., and of Canada, 6 per cent. In some of the European countries it has been from 20 to 30 per cent.

When the rate per cent. is not mentioned in business transactions, the legal rate, of the state wherein the parties agree, is always understood.

On agreement, any rate less than the legal rate becomes lawful ; but as the legal rate in each respective state or country is considered to be justifiable to both borrower and lender, it is almost universally adopted.

Owing to commercial embarrassments, and other causes, parties often give a

higher rate of interest than that established by law. Such is called *usury* or *illegal interest.* For the same reason, a certain sum is often given, and not reckoned at any rate per cent. This is called *carrying* or *shave money* ; although it is virtually the same as usury.

In modern financial and commercial business the term *per cent.* is generally expressed by the character %. Thus, 7 per cent. may be written 7 %.

KNOWLTON'S

INTEREST METHOD,

FOR COMPUTING THE INTEREST OF ANY SUM, FOR A SPECIFIED TIME, AT ANY RATE PER CENT.

When The Time Contains Years.

1. Find the interest of 13 dollars, for 5 years, at 5 %.

OPERATION.

$$\frac{5}{100} \times \frac{5}{1} \times \frac{13}{1} = \$3.25, \textit{Ans.}$$

Analysis. Knowing the interest of one dollar, for one year, at 5 %, to be 5 cents,

it must be five *one* h*undredth* dollars, when reduced to a fraction. Now, since five *one hundredth* dollars is the interest of one dollar, for one year, at 5 %, 5 times this will be the interest of one dollar, for the number of years, at 5 % ; and 13 times this will be the interest of the whole number of dollars, for the number of years, at 5 %. Indicating the operation, and multiplying by the aid of cancellation, gives $3.25, the required answer.

When The Time Contains Years And Months.

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2. What is the interest of $25, for 2 years and 4 months, at 6 % ?

OPERATION.

$$\frac{6}{100} \times \frac{7}{3} \times \frac{25}{1} = \$3.50, \textit{ Ans.}$$

Analysis. Since the interest of one dollar, for one year, at 6 %, is 6 cents, it must be six *one hundredth* dollars represented fractionally. As there are months included in the time, the years and months should be reduced to years and fractions, giving two and one *third* ; and this reduc-

ed to an improper fraction, gives seven *thirds*. If six *one hundredth* dollars is the interest of one dollar, for one year, at 6 %, seven *third* times this will be the interest of one dollar, for the number of years, at 6 %; and 25 times this will be the interest on the whole number of dollars, for the number of years, at 6 %. Indicating the operation, and multiplying by the aid of cancellation, gives $3.50, the required result.

When The Time Contains Years, Months And Days.

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3. What is the interest of $400, for 1 year 5 months and 13 days, at 7 % ?

OPERATION.

$$\frac{7}{100} \times \frac{523}{360} \times \frac{400}{1} = \$40.67\,7\text{-}9, \textit{Ans.}$$

Analysis. As the interest of one dollar, for one year, at 7 %, is 7 cents, it must be seven *one hundredth* dollars, when represented fractionally. Since there are days included in the time, the years, months, and days, should be reduced to days, which gives 523; and as

there are 360 interest days in a year, 523 days must be equal to five hundred twenty-three *three hundred sixtieth* years. Then if seven *one* h*undredth* dollars is the int. of one dollar, for one year, at 7 %, five hundred twenty-three *three* h*und. sixtieth* times this will be the interest of one dollar, for the number of years, at 7 % ; and 400 times this will be the interest on the whole number of dollars, for the number of years, at 7 %. Indicating the operation, and multiplying by the aid of cancellation, gives $40.67 7-9, the result required.

If the student has carefully learned the preceding truths, operations, and analyses, he will be quite prepared to treasure up the following

RULE FOR OPERATION.

Indicate the rate of interest as so many *one hundredth* dollars, by placing it over the number 100. Find the whole number of years, by reducing years and months to years and fractions, and years, months, and days, to days---calling them so many *three hundred sixtieth* years, by writing them over the number 360. Change the number of dollars to a fraction. Indicate the operation, by writing the rate value,

the number of years, and the whole number of dollars, separated by the sign of multiplication, finishing by cancellation whenever practicable.

EXAMPLES FOR PRACTICE.

4 Required the interest of $240, for 4 years 2 months and 5 days, at 6 per cent.

OPERATION.

$$\frac{6}{100} \times \frac{1505}{360} \times \frac{240}{1} = \$60.20, \textit{Ans.}$$

5. What is the interest of $14.10, for 6 months and 10 days, at 5 % ?

Ans. .372 1-12.

6. What is the interest of $3500, for 60 days, at 7 % ?

Ans. $40.83 1-3.

7. Find the interest of one dollar, for 1 year 5 months and 28 days, at 9 3-5 per cent.

OPERATION.

$$9\frac{3}{5} = \frac{48}{5}\ ;\ \frac{48}{5} \div 100 = \frac{12}{125} = \text{the}$$

rate value. Ans. .1434 2-3.

☞ In the preceding example the rate is divided by 100, which is the same as placing it over that number. The latter form would give a *complex fraction.*

8. What is the interest of $722, for 16 days, at 6 % ?

9. What is the amount of $1000, for 1 year 1 month and 1 day, at 6 % ?
Ans. $1065.166 2-3.

10. What is the interest of 54 dollars, for 20 days, at 1 % ?
Ans. three *one hundredth* dollars, or 3 cents.

11. What is the interest of $80, for 7 years and 7 months, at 5 % ?

12. What is the amount of 1 dollar, for 9 months and 10 days, at 7 % ?
Ans. 1.05 4-9.

13. What is the interest of $15, for 8 months, at 6 2-3 % ?
Ans. .66 2 3.

14. Required the interest of $200, for 10 months and 20 days, at 7 per cent.
Ans. $12.44 4-9.

15. Required the interest of $100, from March 8 to August 25, at 6 %.
Ans. $2.83 +.

16. A note of 315 dollars, dated November 6, 1873, became due December 20, the following month ; what was the interest at 7 % ?

$600

Syracuse, Feb. 10, 1874.

17. Six months after date, I promise to pay J. Ross, or order, 600 dollars, for value received.

Stephen Briggs.

This note was settled Jan. 23, 1875 ; How much was then due, no payment having been made ?

Ans. 640.016\frac{1}{2}$.

USEFUL INTEREST TABLES.

FORMED BY MEANS OF KNOWLTON'S INTEREST METHOD, FOR THE USE OF BUSINESS AND PROFESSIONAL PERSONS EVERYWHERE.

TABLE NO. I.

Giving the interest of one dollar, for any number of years from one to ten, at 5, 6, 7, and 8 per cent.

AT ☞	5 %	6 %	7 %	8 %
For 1 year	.05	.06	.07	.08
" 2 "	.10	.12	.14	.16
" 3 "	.15	.18	.21	.24
" 4 "	.20	.24	.28	.32
" 5 "	.25	.30	.35	.40
" 6 "	.30	.36	.42	.48
" 7 "	.35	.42	.49	.56
" 8 "	.40	.48	.56	.64
" 9 "	.45	.54	.63	.72
" 10 "	.50	.60	.70	.80

The above table gives the interest of one dollar, for any number of years under ten. Should any number of years higher than ten be desired, the interest may easily be found by multiplying the rate by the number of years.

TABLE NO. II.

Giving the interest of one dollar, for any number of months in a year, at 5, 6, 7, and 8 per cent.

AT ☞	5 %	6 %	7 %	8 %
For 1 mo.	.0041	.0050	.0058	.0066
" 2 "	.0083	.0100	.0116	.0133
" 3 "	.0125	.0150	.0175	.0200
" 4 "	.0166	.0200	.0233	.0266
" 5 "	.0208	.0250	.0291	.0333
" 6 "	.0250	.0300	.0350	.0400
" 7 "	.0291	.0350	.0408	.0466
" 8 "	.0333	.0400	.0466	.0533
" 9 "	.0375	.0450	.0525	.0600
" 10 "	.0416	.0500	.0583	.0666
" 11 "	.0458	.0550	.0641	.0733
" 12 "	.0500	.0600	.0700	.0800

Table number two and three gives the interest for months and days, true to four decimal places. Many of the numbers are exact, and all are so slightly approximate that they may freely be used for business purposes everywhere.

TABLE NO. III.

Giving the interest of one dollar, for any number of days in a month, at 5, 6,

7, and 8 per cent.

AT ☞	5 %	6 %	7 %	8 %
For 1 day	.0001	.0001	.0001	.0002
" 2 "	.0002	.0003	.0003	.0004
" 3 "	.0004	.0005	.0005	.0006
" 4 "	.0005	.0006	.0007	.0008
" 5 "	.0006	.0008	.0009	.0011
" 6 "	.0008	.0010	.0011	.0013
" 7 "	.0009	.0011	.0013	.0015
" 8 "	.0011	.0013	.0015	.0017
" 9 "	.0012	.0015	.0017	.0020
" 10 "	.0013	.0016	.0019	.0022
" 11 "	.0015	.0018	.0021	.0024
" 12 "	.0016	.0020	.0023	.0026
" 13 "	.0018	.0021	.0025	.0028
" 14 "	.0019	.0023	.0027	.0031
" 15 "	.0020	.0025	.0029	.0033
" 16 "	.0022	.0026	.0031	.0035
" 17 "	.0023	.0028	.0033	.0037
" 18 "	.0025	.0030	.0035	.0040
" 19 "	.0026	.0031	.0036	.0042
" 20 "	.0027	.0033	.0038	.0044
" 21 "	.0029	.0035	.0040	.0046
" 22 "	.0030	.0036	.0042	.0048
" 23 "	.0031	.0038	.0044	.0051
" 24 "	.0033	.0040	.0046	.0053
" 25 "	.0034	.0041	.0048	.0055
" 26 "	.0036	.0043	.0050	.0057
" 27 "	.0037	.0045	.0052	.0060
" 28 "	.0038	.0046	.0054	.0062
" 29 "	.0040	.0048	.0056	.0064
" 30 "	.0041	.0050	.0058	.0066

To use the preceding interest tables, glance down the vertical column of figures, under the given per cent, to the number opposite the given time in the first column of each table. The sum of these numbers will give the interest of one dollar, for the whole time, at the given rate per cent ; and this multiplied by the principal, will give the required answer. Thus,

18. Required the interest of $320, for 2 years 1 month and 5 days, at 7 %.

OPERATION.

Glance down the vertical column under 7 %, in the required tables, and find

Interest for 2 years . .	.1400
" " 1 month . .	.0058
" " 5 days . .	.0009
Sum	.1467

and, .1467 X 320 = 46.94, Ans.

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